## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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| U.S. Serial No. 10/804,735 | ) I hereby certify that this paper is being filed |
| First Named Inventor: Long | ) electronically with the U.S. Patent and |
| | ) Trademark Office on this date: |
| Title: Methods and Apparatus for | ) |
| Merging Critical Sections | ) February 20, 2008 |
| Filed: March 19, 2004 | ) |
| | ) |
| TC/AU: 2192 | ) /Michael W. Zimmerman/ |
| Examiner: Wang | ) Michael W. Zimmerman |
| | ) Reg. No. 57,993 |
| Docket No.: 20002/18495 | ) Agent for Applicants |
| | ) |
| | ) |

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### RESPONSE TO THE OFFICE ACTION DATED DECEMBER 28, 2007

Dear Sir:

Please enter the following amendments and consider the following remarks.

**The Status of the Claims** is reflected in the listing of claims that begins on page 2 of this paper.

**Remarks** begin on page 11 of this paper.

This listing of claims will replace all prior versions, and listings, of claims in the application:

**The Status of the Claims**

1.      (Cancelled)

2.      (Currently Amended)  A method as defined in claim [[1]]12, further comprising:

estimating a cost of merging the first set of instructions and a third set of instructions; and

estimating a cost of merging the second set of instructions and the third set of instructions.

3.      (Original)  A method as defined in claim 2, wherein the cost of merging the first and third sets of instructions and the cost of merging the second and third sets of instructions are greater than the cost of merging the first and second sets of instructions.

4.      (Previously Presented)  A method as defined in claim 2, wherein the third set of instructions comprises a critical section of instructions.

5.      (Previously Presented)  A method as defined in claim 2, wherein the third set of instructions is associated with a critical section.

6.      (Currently Amended)  A method as defined in claim [[1]]12, further comprising:

removing redundant instructions from the merged set of instructions; and

assigning a physical mutual exclusion lock to the merged set of instructions.


7.      (Original)  A method as defined in claim 6, wherein the redundant instructions

comprise instructions used for at least one of entering a set of instructions and exiting the set

of instructions.


8.      (Currently Amended)  A method as defined in claim [[1]]12, wherein the first

and second sets of instructions are associated with respective first and second critical

sections.


9.      (Currently Amended)  A method as defined in claim [[1]]12, wherein at least

one of the first and second sets of instructions is associated with a critical section.


10.     (Currently Amended)  A method as defined in claim [[1]]12, wherein the

dataflow analysis comprises a forward disjunctive dataflow analysis.


11.     (Cancelled)


12.     (Currently Amended)  A method as defined in claim 1,A method comprising:

            estimating a cost of merging a first set of instructions and a second set of

instructions using a dataflow analysis; and

            merging the first and second sets of instructions to form a merged set of

instructions based on the cost of merging the first and second sets of instructions, wherein the

cost of merging the first and second sets of instructions is associated with instructions that

belong to only the first set of instructions and instructions that belong to only the second set

of instructions;

wherein estimating the cost of merging the first and second sets of instructions

comprises:

creating a first vector based on the dataflow analysis, wherein elements of the

first vector comprise instructions contained in at least one of the first and second sets of

instructions; and

creating a cost matrix based on the first vector, wherein the cost matrix

contains the cost of merging the first and second sets of instructions.


13.     (Original)  A method as defined in claim 12, further comprising creating a

second vector having elements comprising a redundancy indicator after merging the first and

the second set of instructions.


14.     (Original)  A method as defined in claim 12, wherein the cost of merging the

first and second sets of instructions is a least expensive element in the cost matrix.


15.     (Original)  A method as defined in claim 12, further comprising updating the

first vector and the cost matrix after merging the first and second sets of instructions.


16.     (Currently Amended)  A method as defined in claim [[1]]12, further

comprising creating a partition including the first and the second sets of instructions before

the first and second sets of instructions are merged.

17. (Cancelled)

18. (Cancelled)

19. (Currently Amended) ~~An apparatus as defined in claim 18,~~ An apparatus comprising:

an instruction analysis module configured to perform a dataflow analysis;

a cost estimation module configured to determine an estimated cost of merging a first set of instructions and a second set of instructions to form a merged set of instructions;

a partition generator configured to merge the first and second sets of instructions based on the estimated cost of merging the first and second sets of instructions, wherein the cost of merging the first and second sets of instructions is associated with instructions that belong to only the first set of instructions and instructions that belong to only the second set of instructions;

a redundant instruction module configured to remove redundant instructions from the merged set of instructions; and

a mutual exclusion lock module configured to assign a first physical mutual exclusion lock to the merged set of instructions;

wherein the redundant instruction module is configured to create a vector having elements in the vector comprising a redundancy indicator.

20.     (Currently Amended)  An apparatus as defined in claim [[18]]19, wherein the redundant instruction module is configured to remove redundant instructions comprising instructions for at least one of entering a set of instructions and exiting the set of instructions.

21.     (Currently Amended)  An apparatus as defined in claim [[17]]19, wherein the instruction analysis module is configured to perform a forward disjunctive dataflow analysis.

22.     (Currently Amended)  An apparatus as defined in claim [[17]]19, wherein the partition generator is configured to create a partition including the first and second sets of instructions before the first and second sets of instructions are merged.

23.     (Currently Amended)  An apparatus as defined in claim [[17]]19, wherein the cost estimation module is configured to:

create a first vector based on the dataflow analysis, wherein the elements of the first vector comprise instructions contained in at least one of the first set of instructions and the second set of instructions; and

create a cost matrix based on the first vector, wherein the cost matrix comprises the cost of merging the first and second sets of instructions,

24.     (Original)  An apparatus as defined in claim 23, wherein the partition generator is configured to determine a least expensive merge operation in the cost matrix.

25.     (Cancelled)

26.     (Currently Amended)  A machine readable medium, as defined in claim [[25]]28, having instructions stored thereon that, when executed, cause the machine to:

estimate a cost of merging the first set of instructions and a third set of instructions; and

estimate a cost of merging the second set of instructions and the third set of instructions.

27.     (Currently Amended)  A machine readable medium, as defined in claim [[25]]28, having instructions stored thereon that, when executed, cause the machine to:

remove redundant instructions from the merged set of instructions; and

assign a physical mutual exclusion lock to the merged set of instructions.

28.    (Currently Amended)  ~~A machine readable medium, as defined in claim 25, having instructions stored thereon that, when executed, cause the machine to:~~ A machine readable medium having instructions stored thereon that, when executed, cause a machine to:

estimate a cost of merging a first set of instructions and a second set of instructions using a dataflow analysis;

merge the first and the second sets of instructions to form a merged set of instructions based on the cost of merging the first and second sets of instructions, wherein the cost of merging the first and second sets of instructions is associated with instructions that belong to only the first set of instructions and instructions that belong to only the second set of instructions;

create a first vector based on the dataflow analysis, wherein elements in the first vector comprise instructions contained in at least one of the first and second sets of instructions; and

create a cost matrix based on the first vector, the cost matrix contains the cost of merging the first and second sets of instructions.

29.    (Original)  A machine readable medium, as defined in claim 28, having instructions stored thereon that, when executed, cause the machine to update the first vector and the cost matrix after merging the first and second sets of instructions.

**30.** (Currently Amended) A machine readable medium, as defined in claim [[25]]28, having instructions stored thereon that, when executed, cause the machine to create a partition including the first and second sets of instructions before the first and second sets of instructions are merged.

## Remarks

The applicants have carefully reviewed the Office action dated December 28, 2007. In light of the forgoing amendments and the following remarks, reconsideration is respectfully requested. Claims 12, 19, and 28, among other claims, were indicated to be allowable if rewritten in independent form. Accordingly, claim 12 has been rewritten to include all of the recitations of claim 1, claim 19 has been rewritten to include all of the recitations of claims 17 and 18, and claim 28 has been rewritten to include all of the recitations of claim 25. All remaining dependent claims have been amended to be dependent on one of claim 19, claim 18, or claim 28. For at least the reasons noted in the final Office action, the applicants respectfully submit that all claims are patentable.

If there is any matter that the examiner would like to discuss, the examiner is invited to contact the undersigned representative at the telephone number set forth below.

The Commissioner is hereby authorized to charge any deficiency in the amount enclosed or any additional fees which may be required during the pendency of this application under 37 CFR 1.16 or 37 CFR 1.17 or under other applicable rules (except payment of issue fees), to Deposit Account No. 50-2455.

Respectfully submitted,

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Dated: February 20, 2008

/Michael W. Zimmerman/

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